furthermore prolonged the latency to epithelial ulceration and reduced ulcer duration. Proliferation measurements with BrdU did not show any substantial effects of DS. The adherens junction protein ß-catenin did significantly increase during irradiation, which occurred earlier with additional DS treatment. The hypoxia markers HIF-1α and GLUT-1 showed a progressive increase during irradiaton alone, which, however, was also not influenced by DS. IL-1ß and NF-κB as markers of inflammation were dramatically increased during irradiation. While DS treatment abolished the radiation-induced increase of IL-1ß, however, no systematical effect on the expression of NF-κB was observed.

Conclusion: DS has a significant mucoprotective effect. This is not based on stimulation of epithelial proliferation nor on modulation of radiation-induced hypoxic changes. In contrast, reduced or modulated inflammatory processes and/or increased/modified function of adherens junctions may have a mechanistic role. This hypothesis, however, needs to be validated in further studies.

Electronic Poster: Radiobiology track: Biomarkers and biological imaging

EP-2047
1H NMR based metabolomic approach to monitoring of the head and neck cancer treatment toxicity

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Purpose or Objective: Anticancer treatment affects composition and concentrations of metabolites in body fluids. In case of head and neck (HNC) cancers the acute radiation syndrome (ARS) was studied only at the genomic, proteomic and lipidomic levels. We aimed to identify and investigate molecular processes of treatment toxicity in HNC patients using high resolution NMR and NMR-based metabolomics.

Material and Methods: Forty five patients with HNC were treated with radiotherapy (RT) or cisplatin-based chemoradiotherapy (CHRT). Blood samples were collected within a week after RT/CHRT completion. The ARS was evaluated using Multi-parameter Monitoring (MPM) – an original evaluation system designed by the study investigators. The patients were divided into two classes (of high and low ARS) on the basis of the highest individual ARS value observed during the treatment. The NMR spectra of the serum samples were acquired on 400.13 MHz Bruker spectrometer at 310 K. The referenced to alanine and bucketed to 0.002 ppm spectra were analyzed using principal component analysis (PCA) and orthogonal partial least squares discriminant analysis (OPLS-DA). Additional statistical analyses (Mann-Whittney test, Pearson correlation) were performed on quantified metabolites.

Results: In the high ARS group we observed the increased signals of N-acetyl-glycoprotein – the NMR marker of inflammation, and acetate – a product of beta-oxidation of adipose tissue fatty acids. The high ARS group showed also the decreased signals of metabolites involved in energy metabolism: branched chain amino acids (BCAAs), alanine, creatinine, carnitine and glucose as well as decreased choline containing compounds reflecting disturbed membrane metabolism. Furthermore, we observed the positive correlations between C-reactive protein (CRP) and N-acetyl-glycoprotein as well as acetate and a percentage weight loss during the treatment. CRP was also negatively correlated with alanine and BCAAs.

Conclusion: 1H NMR is an efficient tool for detection of RT/CHRT toxicity markers in human serum. The results indicate at least three concomitant processes related to high treatment toxicity (high ARS): inflammation, altered energy metabolism and disturbed membrane metabolism. The combination of clinical and molecular approaches could deliver comprehensive information on treatment response, allowing monitoring and/or prediction of tolerance/toxicity of therapy as well as its outcome. Such approach gives a step forward into personalized therapy.

EP-2048
Serum cytokines as a predictive factor in hepatoma patients treated with radiotherapy

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Purpose or Objective: Cytokines, which are involved in chronic inflammation, are also related to tumor aggressiveness and resistance to treatment in many cancers. However, there are limited reports on the significance of cytokines in tumor response to radiotherapy (RT). The aim of this study was to analyze serum cytokine levels and identify their association with treatment outcome in patients with hepatocellular carcinoma (HCC) treated with RT.

Material and Methods: Patients with HCC who treated with RT were eligible for this prospective study. Blood samples were collected before and after completion of the whole RT course. Serum cytokine levels measured using Cytokine Bead Array kits were analyzed with respect to patients' clinical profiles and treatment responses.

Results: Between September 2008 and October 2009, 51 patients were included in the analysis. Median follow-up duration was 12.3 months (range, 0.5-62.3). Forty-seven patients were diagnosed with modified UICC stage III or IV disease at the time of RT. Baseline serum IL-8 level increased with increasing stage and the IL-6 level was highest in patients with a history of pre-RT treatment (treatment-non-naïve). A higher baseline serum IL-6 level was also observed in patients with treatment failure, including overall, infield, and outfield failure, than in those without treatment failure. In subgroup analysis, a significant difference in serum IL-6 level was observed only in treatment-non-naïve versus treatment-naïve patients. Median overall survival and progression-free survival (PFS) were 13.9 and 7.7 months, respectively. Elevated serum IL-6 level was significantly associated with PFS for patients with infield failure (HR 1.011, $p<0.0001$).

Conclusion: The current findings suggest that assessment of baseline serum IL-6 level may be helpful to predict treatment outcome after RT for HCC, especially in patients who undergo treatment before RT.

EP-2049
Diffusion MRI for following tumor modifications after neoadjuvant radiotherapy

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Purpose or Objective: Neoadjuvant radiotherapy (NeoRT) improves tumor local control and tumor resection in many cancers. The timing between the end of the NeoRT and surgery is driven by the occurrence of side effects or the tumor downsizing. Some studies demonstrated that the